PATENTS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Francis BRIAND et al. Box Non-fee Amendment

Serial No. (unknown) GROUP

Filed herewith Examiner

LASER/ARC HYBRID WELDING PROCESS WITH APPROPRIATE GAS MIXTURE

PRELIMINARY AMENDMENT

Commissioner for Patents

Washington, D.C. 20231

Sir:

Prior to the first Official Action and calculation of the filing fee, please amend the above-identified application as follows:

IN THE CLAIMS:

Please amend claims 3-21 as follows:

--3.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of argon with a content greater than or equal to 70% by volume and of at least one additional compound chosen from H_2, O_2, CO_2 and N_7 with a content of 0.1 to 30% by volume, preferably a gas mixture consisting of argon with a content greater than or equal to 70% by volume and of 0.1 to 30% by volume of an additional compound chosen from H_2, O_2, CO_2 and N_2.--

--4.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of argon with a content greater than or equal to 70% by volume and of 0.1 to 30% by volume of several additional compounds chosen from H_2, O_2, CO_2 and N_2, preferably a mixture of argon, O_2 and CO_2.--

--5.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of helium with a content greater than or equal to 70% by volume and of at least one additional compound chosen from H_2,O_2, CO_2 and N_2 with a content of 0.1 to 30% by volume, preferably a gas mixture consisting of helium with a content greater than or equal to 70% by volume and of 0.1 to 30% by volume of an additional compound chosen from H_2, O_2, CO_2 and N_2.--

--6.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of helium with a content greater than or equal to 70% by volume and of 0.1 to 30% by volume of several additional compounds chosen from H_2,O_2, CO_2 and N_2, preferably a mixture of helium, 02 and CO_2 and furthermore possibly containing H_2.--

--7.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 70% by volume of helium and argon and of 0.1 to 30% by volume of at least one additional compound chosen from H_2, O_2, CO_2 and N_2, preferably a gas mixture consisting of 0.1% to 69.9% by volume of helium, of 0.1% to 69.9% by volume of argon and of 0.1 to 30% by volume of at least one additional compound chosen from H_2, O_2, CO_2 and N_2, the sum of the argon and helium contents being at least 70% of the total volume of the mixture.--

--8.(Amended) The welding process as claimed in claim 1, wherein the workpiece or workpieces to be welded are made of a metal or a metal alloy chosen from coated or uncoated steels, particularly assembly steels, HLES steels, carbon steels, steels having a layer of zinc alloy on the surface, stainless steels, aluminum or aluminum alloys and high yield point steels.--

--9.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 70% by volume of helium and/or argon and of 0.1 to 30% by volume of at least one additional

compound chosen from O_2 and CO_2 and wherein the workpiece or workpieces to be welded are made of steel, especially carbon steel.--

--10.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 70% by volume of helium, of 0.1 to 30% by volume of hydrogen and of 0 to 29.9% by volume of at least one additional compound chosen from O_2 and CO_2, and wherein the workpiece or workpieces to be welded are made of stainless steel.--

--11.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 90% by volume of helium or of argon and of 0.1 to 10% by volume of at least one additional compound chosen from O_2 and CO_2, and wherein the workpiece or workpieces to be welded are made of aluminum, preferably of at least 96% by volume of helium or argon and of 0.1 to 4% by volume of at least one additional compound chosen from O_2 and CO_2.--

--12.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 85% by volume of helium or of argon and of 0.1 to 15% by volume of H_2, and wherein the workpiece or workpieces to be welded are made of stainless steel, preferably of at least 90% by volume of helium or argon and of 0.1 to 10% by volume of H_2.--

--13.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 70% by volume of helium and/or argon and of 0.1 to 30% by volume of N_2, and wherein the workpiece or workpieces to be welded are made of steel, preferably of at least 80% by volume of helium and/or argon and the balance being N_2.--

--14.(Amended) The welding process as claimed in claim 1, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 85% by volume of helium and/or argon and of 0.1 to 15% by volume of H_2 and CO_2, and wherein the workpiece or workpieces to be welded are made of stainless steel.--

--15.(Amended) The welding process as claimed in claim 1, wherein the laser beam is emitted by an Nd:YAG or CO_2 laser and/or wherein the electric arc is a plasma arc.--

--16.(Amended) The welding process as claimed in claim 1, wherein the electric arc is delivered by a plasma-arc torch and preferably the laser beam and said arc are delivered by a single welding head.--

--17.(Amended) The welding process as claimed in claim 1, wherein the electrode is consumable or not consumable.--

--18.(Amended) Use of a welding process as claimed in claim 1 for welding at least one tailored blank intended to constitute at least one part of a vehicle body element.--

--19.(Amended) Use of a welding process as claimed in claim 1 for joining together, by welding, metal workpieces having different thicknesses, particularly tailored blanks.--

--20.(Amended) Use of a welding process as claimed in claim 1 for joining together, by welding, metal workpieces having the same or different thicknesses and having different

metallurgical compositions or metallurgical grades, particularly tailored blanks.--

--21.(Amended) Use of a welding process as claim in claim 1 for joining together, by welding, the two longitudinal edges of a pre-tube.--

Claims 3-21 have been amended to correct multiple dependency. Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE"**.

Respectfully submitted,

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"VERSION WITH MARKINGS TO SHOW CHANGES MADE"

Claims 3-21 have been amended as follows:

3.(Amended) The welding process as claimed in ~~either of claims~~claim 1~~ and 2~~, wherein the shielding atmosphere is formed by a gas mixture consisting of argon with a content greater than or equal to 70% by volume and of at least one additional compound chosen from H_2, O_2, CO_2 and N_7 with a content of 0.1 to 30% by volume, preferably a gas mixture consisting of argon with a content greater than or equal to 70% by volume and of 0.1 to 30% by volume of an additional compound chosen from H_2, O_2, CO_2 and N_2.

4.(Amended) The welding process as claimed in ~~one of claims~~claim 1~~ to 3~~, wherein the shielding atmosphere is formed by a gas mixture consisting of argon with a content greater than or equal to 70% by volume and of 0.1 to 30% by volume of several additional compounds chosen from H_2, O_2, CO_2 and N_2, preferably a mixture of argon, O_2 and CO_2.

5.(Amended) The welding process as claimed in ~~either of claims~~claim 1~~ and 2~~, wherein the shielding atmosphere is formed by a gas mixture consisting of helium with a content greater than or equal to 70% by volume and of at least one additional compound chosen from H_2,O_2, CO_2 and N_2 with a content of 0.1 to 30% by volume, preferably a gas mixture

consisting of helium with a content greater than or equal to 70% by volume and of 0.1 to 30% by volume of an additional compound chosen from H_2, O_2, CO_2 and N_2.

6.(Amended) The welding process as claimed in ~~one of claims~~claim 1, ~~2 or 5,~~ wherein the shielding atmosphere is formed by a gas mixture consisting of helium with a content greater than or equal to 70% by volume and of 0.1 to 30% by volume of several additional compounds chosen from H_2,O_2, CO_2 and N_2, preferably a mixture of helium, 02 and CO_2 and furthermore possibly containing H_2.

7.(Amended) The welding process as claimed in ~~one of claims~~claim ~~1 to 6~~, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 70% by volume of helium and argon and of 0.1 to 30% by volume of at least one additional compound chosen from H_2, O_2, CO_2 and N_2, preferably a gas mixture consisting of 0.1% to 69.9% by volume of helium, of 0.1% to 69.9% by volume of argon and of 0.1 to 30% by volume of at least one additional compound chosen from H_2, O_2, CO_2 and N_2, the sum of the argon and helium contents being at least 70% of the total volume of the mixture.

8.(Amended) The welding process as claimed in ~~one of claims~~claim ~~1 to 7~~, wherein the workpiece or workpieces to be welded are made of a metal or a metal alloy chosen from

coated or uncoated steels, particularly assembly steels, HLES steels, carbon steels, steels having a layer of zinc alloy on the surface, stainless steels, aluminum or aluminum alloys and high yield point steels.

9. (Amended) The welding process as claimed in ~~one of claims~~claim 1 ~~to 8~~, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 70% by volume of helium and/or argon and of 0.1 to 30% by volume of at least one additional compound chosen from O_2 and CO_2 and wherein the workpiece or workpieces to be welded are made of steel, especially carbon steel.

10. (Amended) The welding process as claimed in ~~one of claims~~claim 1 ~~to 8~~, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 70% by volume of helium, of 0.1 to 30% by volume of hydrogen and of 0 to 29.9% by volume of at least one additional compound chosen from O_2 and CO_2, and wherein the workpiece or workpieces to be welded are made of stainless steel.

11. (Amended) The welding process as claimed in ~~one of claims~~claim 1 ~~to 8~~, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 90% by volume of helium or of argon and of 0.1 to 10% by volume of at least one additional compound chosen from O_2 and CO_2, and wherein the

workpiece or workpieces to be welded are made of aluminum, preferably of at least 96% by volume of helium or argon and of 0.1 to 4% by volume of at least one additional compound chosen from O_2 and CO_2.

12. (Amended) The welding process as claimed in ~~one of claims~~claim 1~~ to 8~~, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 85% by volume of helium or of argon and of 0.1 to 15% by volume of H_2, and wherein the workpiece or workpieces to be welded are made of stainless steel, preferably of at least 90% by volume of helium or argon and of 0.1 to 10% by volume of H_2.

13. (Amended) The welding process as claimed in ~~one of claims~~claim 1~~ to 8~~, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 70% by volume of helium and/or argon and of 0.1 to 30% by volume of N_2, and wherein the workpiece or workpieces to be welded are made of steel, preferably of at least 80% by volume of helium and/or argon and the balance being N_2.

14. (Amended) The welding process as claimed in ~~one of claims~~claim 1~~ to 8~~, wherein the shielding atmosphere is formed by a gas mixture consisting of at least 85% by volume of helium and/or argon and of 0.1 to 15% by volume of H_2 and

CO_2, and wherein the workpiece or workpieces to be welded are made of stainless steel.

15. (Amended) The welding process as claimed in ~~one of claims~~claim 1 ~~to 14~~, wherein the laser beam is emitted by an Nd:YAG or CO_2 laser and/or wherein the electric arc is a plasma arc.

16. (Amended) The welding process as claimed in ~~one of claims~~claim 1 ~~to 15~~, wherein the electric arc is delivered by a plasma-arc torch and preferably the laser beam and said arc are delivered by a single welding head.

17. (Amended) The welding process as claimed in ~~one of claims~~claim 1 ~~to 16~~, wherein the electrode is consumable or not consumable.

18. (Amended) Use of a welding process as claimed in ~~one of claims~~claim 1 ~~to 17~~ for welding at least one tailored blank intended to constitute at least one part of a vehicle body element.

19. (Amended) Use of a welding process as claimed in ~~one of claims~~claim 1 ~~to 17~~ for joining together, by

welding, metal workpieces having different thicknesses, particularly tailored blanks.

20.(Amended) Use of a welding process as claimed in ~~one of claims~~claim 1 ~~to 17~~ for joining together, by welding, metal workpieces having the same or different thicknesses and having different metallurgical compositions or metallurgical grades, particularly tailored blanks.

21.(Amended) Use of a welding process as claim ~~in claims~~ claim 1 ~~to 17~~ for joining together, by welding, the two longitudinal edges of a pre-tube.